Attachment D-6
Tanks 13B, 14B & 14C Assessment

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A.C.E.C.

INSTALLATION CERTIFICATION

FOR

NEW HAZARDOUS WASTE STORAGE

TANKS
(TA-13B, TA-14B, TA-14C)

AT

ELI LILLY INDUSTRIES
MAYAGUEZ, PUERTO RICO

PPA PROJECT #92023
MAY, 1992

CERTIFICATION

I hereby certify: That, I am an independent, registered and qualified Professional Chemical Engineer licensed to practice in Puerto Rico; and to the best of my knowledge, that this document presents true and accurate information, of the procedures of the design and installation for the new tank systems (TA-13B, 14B, 14C) for the storage of hazardous wastes at Eli Lilly Industries, Mayaguez plant pursuant to the guidelines and regulations established by the Environmental Protection Agency in 40 CFR 264.192 of the Federal Regulations, and the Rules 805 and 806 of the Environmental Quality Board (EQB) "Regulations for the Design and Installation.

This certification is to the effect that all applicable EPA regulations have complied with the Puerto Rico Environmental Quality Board (EQB) Regulation for the Control of Hazardous Wastes.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designated to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation

In San Juan, Puerto Rico May 26, 1992

Carlos J. Ramos, P.E.
Registered Prof. Engineer
Puerto Rico #09296

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EXECUTIVE SUMMARY

This report presents a certification by Mr. Carlos J. Ramos, a Licensed Professional Chemical Engineer, who is a recognized consultant concerning EPA & EQB regulations pertaining to HW regulations.

A description is also included of the new storage tank facilities used to store hazardous wastes at Eli Lilly Industries, Inc. (Mayaguez facilities). This is to certify RCRA compliance requirements of Design and Installation of New Tank System or Components as described in 40 CFR Section 264.192.

CERTIFICATION

I hereby certify: That, I am an independent, registered and qualified Professional Chemical Engineer licensed to practice in Puerto Rico; and to the best of my knowledge, that this document presents true and accurate information, of the procedures of the design and installation for the new tank systems for the storage of hazardous wastes at Eli Lilly Industries, Mayaguez plant pursuant to the guidelines and regulations established by the Environmental Protection Agency in 40 CFR 264.192 of the Federal Regulations, and the Rules 805 and 806 of the Environmental Quality Board (EQB) "Regulations for the Design and Installation.

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1.0 INTRODUCTION

1.1 Authorization of this Certification Report

This Certification Report (C.R.) was requested by Mr. Braulio González, Project Engineer Manager at Eli Lilly, Industries, Inc., per A scope of work stated in our revised proposal dated in October, 1991.

1.2 Goals and Objectives of this Certification Report

The goals of this (C.R.) is to present to the regulatory agencies, Environmental Protection Agency and Environmental Quality Board (EPA & EQB), the certification of the three (3) new spent wastes storage tanks for the Eli Lilly Industries, Inc., Mayaguez, Puerto Rico facilities to comply with RCRA requirements as specified in 40 CFR 264.192 & 265 subpart J.

2.0 FACILITIES DESCRIPTION

2.1 Existing Conditions

Eli Lilly Industries, Inc. (Lilly) started its Mayagüez manufacturing operation during 1966. The plant is located at P.R. State Road No. 2, Km. 146.7, Mayagüez, Puerto Rico 00681. (See Figure 2.1) The buildings have an area of 60,000 ft^2, and occupy fifty (50) acres of land.

Lilly is a chemical process plant that manufactures bulk pharmaceutical products. There are five (5) finished products manufactured at this site; Cephalexin, Nizatidine, Ilosone, Darvon, and Fluoxetine. These products are then transferred to Eli Lilly Industry facilities located in Carolina for final finishing and packaging.

The hazardous waste generated during the manufacturing activities come from all the above mentioned processes.

During operations, waste solvents and aqueous solutions are generated. The waste streams are placed in holding tanks and then incinerated in a permitted hazardous waste incinerator.

Table I includes the raw materials that generate hazardous waste.

LIST OF APPENDICES

TABLE I

Raw Materials that Generate Hazardous Wastes

Acetone

Acetonitrile

Ethyl Ether

Formaldehyde

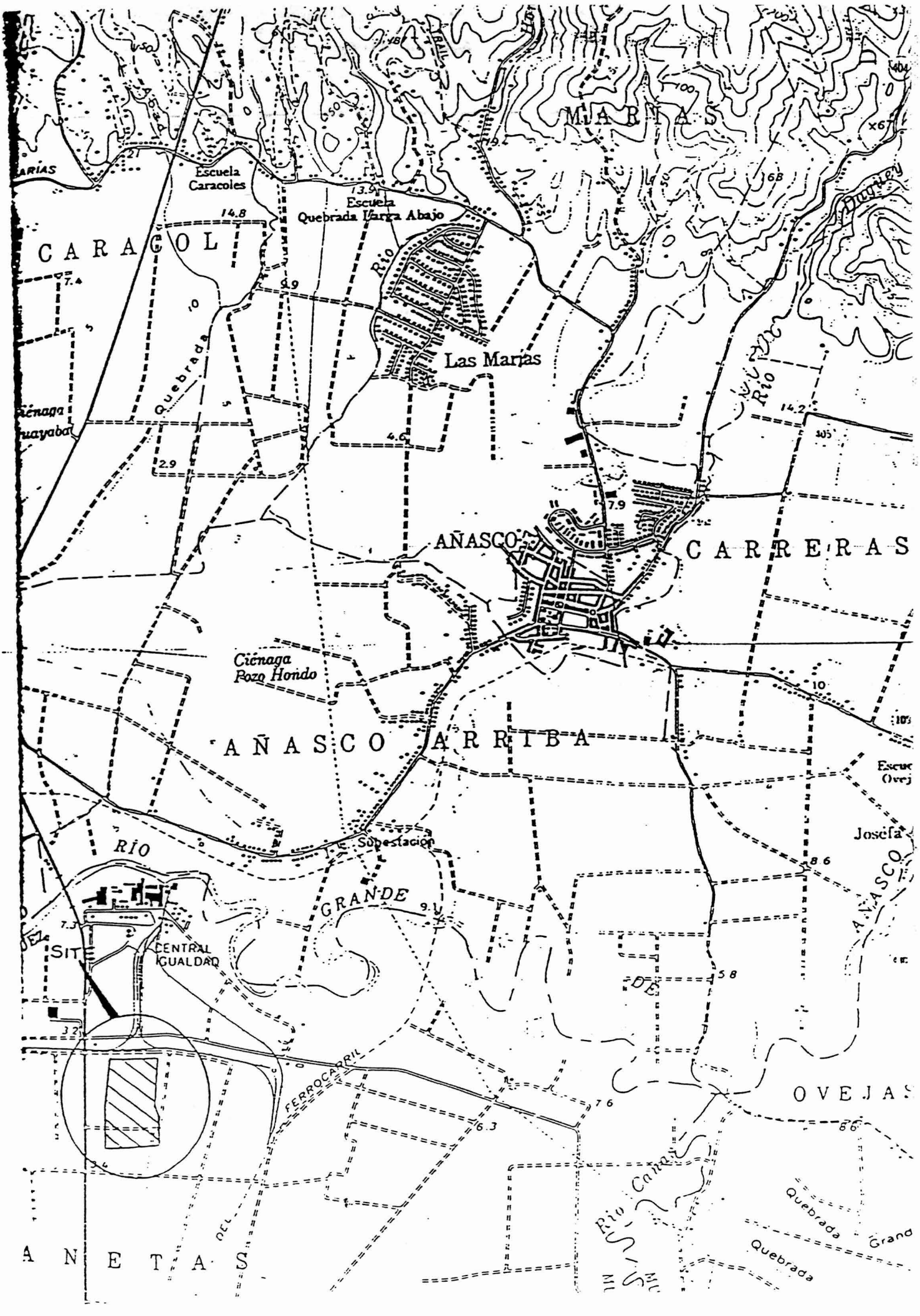
Pyridine

Phenol

Toluene

Methyl Alcohol

Isobutyl Alcohol

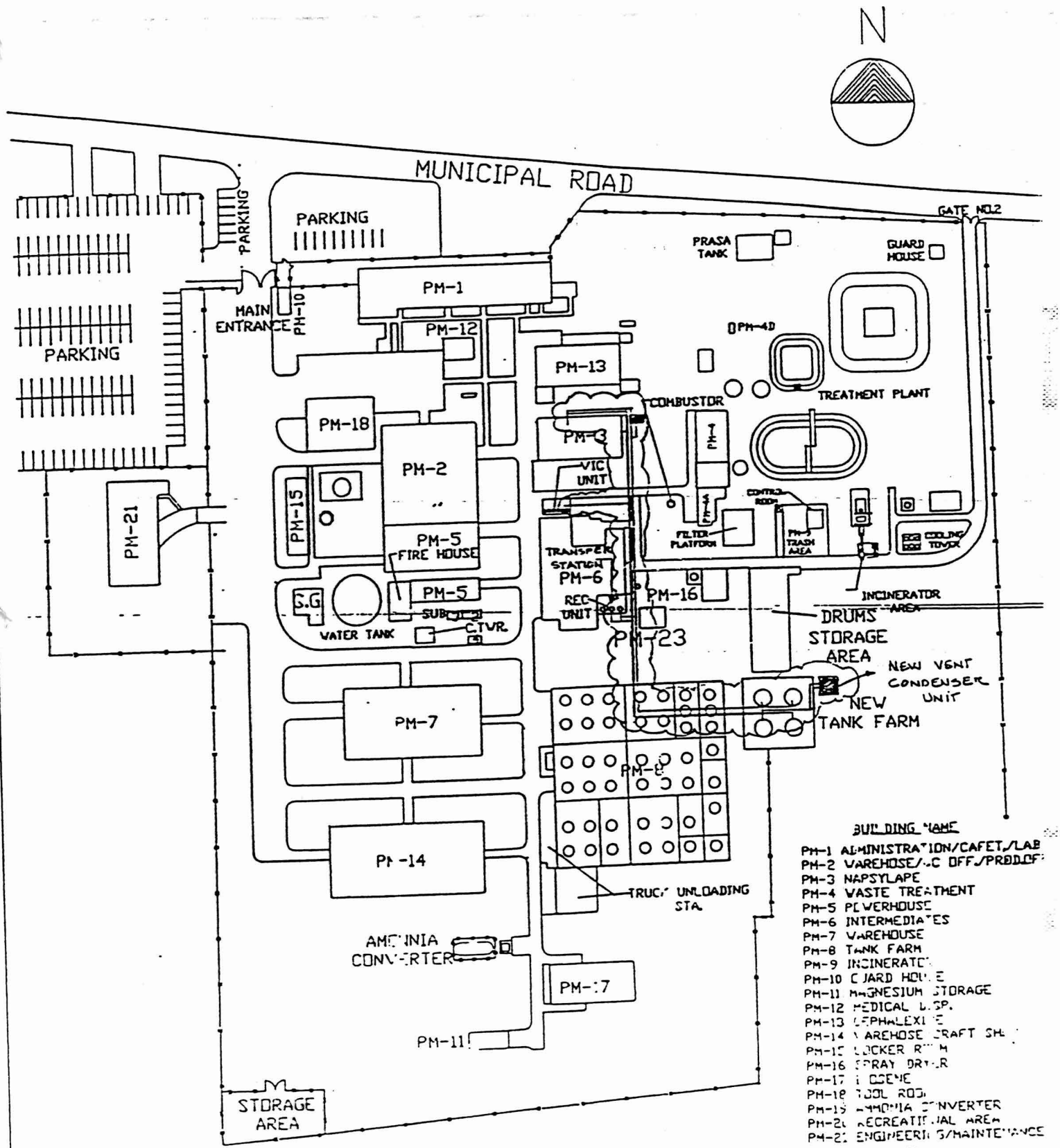

MARIAS
Escuela Caracoles
Escuela Quebrada Larga Abajo
CARACOL
Las Marias
Quebrada
Río
AÑASCO
CARRERAS
Cienaga Pozo Hondo
AÑASCO ARRIBA
Subestación
RIO GRANDE
CENTRAL IGUALDAD
FERROCARRIL
OVEJAS
ANETAS
Quebrada Grand
Quebrada

Recently, Eli Lilly Industries, Inc., acquired the permits to begin the production of Nizatidine. This product essentially substitutes an existing process **Acetohexamide.** The process of **Nizatidine** will be done in the existing PM-6 building, while the other half of the building will be used for several existing processes. A scrubber system and a combustor (Fume Incinerator) were installed outside of PM-6 on, the Northeast corner of the building to control air emissions to the atmosphere in order to comply with the federal and local regulations. The existing tank farm, where all the liquid Hazardous Wastes are stored (High BTU wastes and Low BTU wastes) before incineration, was expanded by 3,600 sq. ft. of diked area. (See Figure 2.2 for existing tanks farm dike conditions.) The Nizatidiene spent liquids wastes are stored in this new diked area before being transferred to the high or low BTU tanks at the existing tank farm. The current tank farm is 26,000 sq. ft.

3.0 DESIGN STANDARDS FOR NEW TANKS 40 CFR 264.192

The three new tanks storing hazardous wastes at Eli Lilly (Mayaguez) are classified as waste storage tanks and were designed per American Petroleum Institute (API) 650 standards. (See Appendix A for the tanks API specifications.) The new tanks tagged 13B, 14B, and 14C are each 50,000 gals in capacity, 20 ft. diameter and 24 ft. high.

A structural assessment, for the three new tanks was done by an independent structural engineer to determine sufficient structural strength and compatibility with the wastes to be stored. The three new tanks were found to be adequate and comply with the requirements of the mentioned standards and for the service to be used. (See Appendix B for the certification of an independent structural engineer for the three new tanks.)



ELI LILLY INDUSTRIES MAYAG
PLANT SITE
DWN BY:J/LUGD DATE:9/3

4.0 HAZARDOUS CHARACTERISTICS OF THE WASTES

All the wastes handled at Eli Lilly, and to be handled by the new product Nizatidine, are ignitable wastes containing the following constituents:

PARAMETERS	PRIMARY WASTES RANGE (W/V%)	SECONDARY WASTES RANGE (W/V%)
Acetone	0 - 60	0 - 10
Acetonitrile	0 - 20	0 - 10
Amyl Acetate	0 - 15	0 - 1
Amyl Alcohol	0 - 1	0 - 1
Amylene	0 - 8	0 - 2
Cyclohexylamine	<1	<1
Diethyl Ether	<1	<1
Ethanol	0 - 5	0 - 3
Ethyl Acetate	0 - 21	0 - 10
Hexane	<1	<1
Isoamyl Acetate	0 - 15	0 - 2
Methanol	0 - 30	0 - 25
Methylene Chloride	0 - 20	0 - 16
Toluene	0 - 35	0 - 2
Water	0 - 35	50 - 95

It was determined that the tanks are compatible with the wastes to be stored by using as reference the corrosion literature included as Appendix C.

5.0 CORROSION PROTECTION

The three new tanks were designed according to American Petroleum Institute (API) with a corrosion allowance of 0.25" in the shell and 0.125 " in the roof. In addition, the three tanks were coated with Glid Guard Epoxy Chemical Resistant Finish No. 5240, which provides additional corrosion protection. (See Appendix D for coating Specification.)

6.0 TANK INSTALLATION AND INTEGRITY TESTING

The tank installation was performed by the tank designer Alonso & Caruso. After the installation, the tanks were hydrostatically tested and the test was satisfactory. In addition, the designers made a NDE inspection. This is a nondestructive method, which uses a fluorescent penetrant liquid, to evaluate the general service condition and detects inconsistencies that are open in the weld surface area. This test was performed in strict accordance with the latest edition of ASME Section V. (See Appendix E for integrity test results and penetrant test results.

7.0 ANCILLIARY EQUIPMENT

All the piping connected from the production areas to the new tanks are aboveground. (See Figure 2.1 for a layout of the piping and routing.) This piping was visually inspected for leaks, misalignment, integrity of supports, vibration, external corrosion and found to be in good condition. All the piping is stainless steel 304 or Teflon lined with welded connections according to the ASTM-A312 standard.

In addition to this equipment, the tanks have the following equipment necessary to comply with the requirements of **Design and Installation of New Tank System or Components described in 40 CFR Section 264.192,** stated in EPA regulations. This equipment is as follows:

1) **Level indicator and level control**

   The system is composed with level indicators and level controls in each tank. In case the level rises above the maximum level, a signal is sent to the automatic valve to close and deviate the flow to the other tank. This system prevents overfilling of each tank.

2) **Level switch to waste cut-off stream is needed to prevent overfilling in the tanks.**

3) **Conservation vent**

   Each tank has a combination of flame arrester and conservation vent (ProtectoSeal) 3"x 4" set at 2.5 water column vaccum and 6" water column pressure. The combination of conservation vent and flame arrester is discharged to the double stage condenser to condensate all the fumes generated inside of each tank.

4. Emergency relief vent

Each tank has an emergency relief valve of 16". This valve will relieve the pressure in each tank, in case the pressure increases inside of the tank above the pressure design of the tank.

5. Vent condensers

All the vents of each tank are connected to the double stage condenser. This condenser minimizes the fume emissions into the atmosphere. All the fumes or solvents that are condensed are recirculated to the tank system thru pumps in the condenser vent equipment (See Figure 7.1 piping plan for the location of the unit.)

8.0 SECONDARY CONTAINMENT

A secondary containment, as required for the new tank system that stored material that were hazardous wastes subsequent to January 12, 1987, was installed. A secondary containment (a vault or concrete dike) was designed to prevent migration of wastes or accumulated liquid out of the system into the soil, groundwater or surface water at any time during the use of the tank system. The capacity of the diked area was designed for the largest volume, in this case 50,000 gallons. The dike area covers a total of four tanks of 50,000 gallons each. At present, there are only three (3), but all the structures and foundations are for a four (4) tank system. These new tanks store the liquid wastes from the process and chemical production areas. These wastes are analyzed for calorific contents (BTU) and then transferred to the low or high BTU storage tanks, in the existing tank farm, before incineration.

The diked (vault) area has 110% of the capacity of the largest tank (55,000). The diked area was designed using the rainfall data of 100 years published by the United States Geological Survey.

This vault (diked area) was constructed with chemical resistant water stops placed at all joints.

interior coating compatible with the wastes to be stored was installed. This interior coating prevents migration of wastes into the concrete for approximately 24 hrs. (See Appendix G for MSDS of the coating applied to the diked area.) Compatibility and effectiveness of the coating applied was evaluated to determine inmersion and possible subsoil during a spillage situation. The results of the study illustrated that the coating applied to the secondary contamination was effective during a spill situation. (See appendix H for study results.)

9.0 INSPECTIONS

Three site inspections were performed to Eli Lilly Industries to verify the compliance of tanks with EPA and EQB regulations in order to certify that the tanks comply with RCRA regulations.

The inspections were done during the installation phase and at the end of system installation. During the inspections, all the tanks were hydrostatically tested. (See Appendix E for the hydrotest and the Fluorescent Liquid Penetrant Test certification.) During the inspections all the routes of the piping were also inspected. All the piping installed are the teflon Line or Stainless steel 304 sch 5. (See Figure 2.1 for the piping plan.) Structural calculations of the foundation, dike, and tanks were done by an independent Professional Licensed Engineer. All the calculations done were found in compliance with the design and RCRA regulations. (See Appendix B for the structural certification.) During the inspections performed at the new tank farm, the requirements for RCRA were complied with.

APPENDIX SECTION

APPENDIX A

TANKS (API) SPECIFICATIONS AND SHOP DRAWINGS

API Standard 650
Storage Tank Specification Data Sheet

Date _____ Sheet 1 of 3

By _____ File No. _____

General Information (By Purchaser)

1 Purchaser/Agent _____

Address _____

City _____ State _____ Phone _____

2 User _____

3 Erection Site: Name of Plant _____

Location _____

4 Tank No. 13B, 14B, 14C Tank Capacity (bbl): Nominal _____ Net Working _____

5 Pumping Rates: In _____ bbl/hr. Out _____ bbl/hr.

6 Max. Operating Temperature _____ F

7 Product Stored _____ Design Specific Gravity _____ @ _____ F

Design Metal Temp. _____ F Vapor Pressure _____ in. water

8 Corrosion allowance (in.): Shell 0.250" Roof 0.125"

Bottom 0.250" Structurals _____

9 Shell Design: Basic API 650 YES App. A _____ App. F YES Design Pressure 1.0 PSIG

10 Roof Design: Basic API 650 YES Floating Roof App. C _____

Internal Floating Roof App. H _____

Frangible Roof Joint: Yes X No _____

11 Roof Loads: Uniform Live (consider snow) 25 lb/sq. ft.

Special Loading (provide sketch) _____

12 Earthquake Design per App. E: Yes YES No _____

Seismic Zone (Fig. E-1) 3 Essential Facilities Factor 1.0

Zone Coefficient (Table E-1) 0.75

Site Amplification Factor (Table E-2) 1.5

Roof Tie Rods (3.10.4.5): Yes _____ No X

13 Wind Load: Velocity (mph) 33 PSF

Provide Intermediate Windgirder (as per 3.9.7): Yes _____ No X

14 Environmental Effects: Rainfall, max. _____ in. per hr.

Snowfall, total accumulation _____ in.

15 Diameter and/or Height Restrictions _____ Diameter, max.

_____ Height, max.

16 Foundation Type: Earth _____ Concrete Ringwall _____

Other _____

Remarks THIS SPECIFICATION IS THE SAME FOR ALL THREE (3) TANKS: 13 B, 14 B, 14C

Sheet 2 of 3
File No. _____

Construction Details (By Manufacturer and/or Purchaser, as Applicable)

1 Manufacturer ALONSO & CARUS IRON WORKS, INC.
Address P.O. BOX 566 State PUERTO RICO Phone 809-788-1065
City CATAÑO
Serial No. 942-88, 943-88, 944-88

2 Fabricator SAME AS ABOVE
Address _____ State _____ Phone _____
City _____
Serial No. _____

3 Material Specifications: Shell A-36
Roof A-36
Bottom A-36
Structurals A-36

4 Shell Courses (no. of) 3

5 Plate Width and Thickness (including corrosion allowance)
1 8'-0".....3/8" 2 8'-0".....5/16" 3 8'-0".....5/16
4 _____ 5 _____ 6 _____
7 _____ 8 _____ 9 _____

6 Tank Bottom: Plate Thickness 1/2"
Seams (check one) _____ lap X butt
Slope 1/8" in. per ft. Check one: To _____ From X Center

7 Bottom Annular Plates Min. Width and Thickness (see 3.5) NO

8 Roof to Shell Detail: Fig. F-1 DETAIL D.

9 Intermediate Windgirder: Yes _____ No X
Top Windgirder (use as walkway): Yes _____ No X

10 Roof Type: Supported _____ Self-Supported CONE
Slope or Radius 3-5/16:12 Floating _____

11 Roof Plate: Thickness 5/16 Lap Joint _____
Butt Joint X

12 Paint-Shell: Exterior-Yes X No _____ Interior-Yes _____ No X
Bottom Interior-Yes _____ No X Underside-Yes _____ No X
Surface Preparation SSPC-SP6

13 Tank Bottom Coating: Interior-Yes _____ No X Material _____
Application Specification _____

14 Paint: Structural Steel Interior-Yes _____ No X Exterior-Yes XX No _____
Specification SSPC-SP6

15 Inspection By: Shop X Field X

16 Weld Examination: Radiograph SPOT X-RAY
Supplementary Liquid Penetrant or Ultrasonic LIQUID PENETRANT

17 Films NINE (9) Property Of ALONSO & CARUS IRON WORKS, INC.

18 Leak Testing: Bottom VACUUM-FULL OF WATER. Roof VACUUM
Shell FULL OF WATER

19 Mill Test Reports Required: Yes X No _____
Plate A -36 Structural Shapes A-36

20 Purchaser's Reference Drawing TEMP-2579-300

21 Tank Size: Diameter and Height in ft. 20'-0" DIA. X 24'-2" HIGH.

22 Date of Edition or Revision of API Standard 650 EIGHTH EDITION- 1988

Remarks

6/9/89

Alonso & Carus

Sheet 3 of 3
File No.

Appurtenances (By Manufacturer and/or Purchaser, as Applicable)

1 Stairway Style (check one): Circular _____ Straight X
Angle, degree to horizontal _____ Ladder _____
2 Walkway: Width 3'-2" Length 10'-0"
3 Drawoff Sump: Standard _____ Special _____
4 Bolted Door Sheet (App. A only): _____ Raised-Type _____ Flush-Type _____
5 Scaffold Hitch _____
6 Internal Pipe: Swing Line _____ Suction Nozzle _____
Heating Coil Surface Area _____ sq. ft.
7 Roof Drain: Hose _____ Jointed _____ Siphon _____
8 Shell Manways: No. and Size 1-30" DIA.
9 Roof Manways: No. and Size 1-20" DIA.
10 Shell Nozzles (See Fig. 3-4B, 3-5, 3-6, and Tables 3-8,3-9, and 3-10)

Mark	Size	Flanged			Screwed					Orientation N = 0°	Height From Bottom	Service
		SGL	DBL	SPL	A	B	C	D	E			
10	2	X								285°	6"	LEVEL
11	2	X								285°	23'-8"	LEVEL
12	8		X							225°	1'-8"	INLET
13	8		X							225°	5'-2"	OUTLET
14	3	X								315°	1-3/4	DRAIN
15	3	X								45°	6"	OUTLET
16	3	X								90°	6"	OUTLET
17	3	X								135°	6"	OUTLET

11 Roof Nozzles (including venting connection) (See Fig. 3-4 and 3-15 and Tables 3-16 and 3-17)

Mark	Size	Flanged	Screwed	Reinf.	Orientation N = 0°	Distance From Center	Service
1	10	X			CENTER	0	VENT
3	6	X			300°	8'-6"	INLET
4	6	X			315°	8'-6"	INLET
5	4	X			30°	8'-6"	INLET
6	4	X			330°	8'-6"	VENT
7	2	X			345°	8'-6"	INLET
8	6	X			45°	8'-6"	INLET
9	3	X			210°	8'-6"	ALARM
19	4	X			60°	8'-6"	INLET

Note: Sketch and/or separate sheet may be attached to cover special requirements.

APPENDIX B

STRUCTURAL CERTIFICATION OF NEW TANKS

RAFAEL NEGRON ROMANO, PE, MSCE
Consulting Engineer
Banco de Ponce Bldg. Suite 500
1250 Ponce de León Ave., Santurce, P.R. 00907
Tels: (809) 722-3671 / 795-6040
Fax: 725-9085

12 March 1989

TO: PEDRO PANZARDI & ASSC.
Banco de Ponce Bldg. Suite 500
Santurce, PR; Attention: Mr. Carlos Ramos, PE

RE: Certification of Hazardous Waste Tank and Foundation
for Elli Lilly, Mayaguez, PR

Dear Mr. Ramos:

A review of the reference steel tank and concrete foundation was made using engineering and design data provided by PPA and Alonso & Carus, the tank designer and fabricator. It was determined that both the tank and foundation are adequate and can be certified for use with the following remarks:

1. The specific gravity of hazardous wastes to be contained by the tank will not exceed 1.1 (69 pcf) as previously discussed.

2. Tank design was checked using AWWA(American Water Works Association) standards and the min. required thickness of the bottom shell exceeds the one provided in the construction drawings. However the client specified the use of API standards by which the given shell thickness is adequate and this is acceptable.

3. Tank was designed to resist .5 psig negative pressure, or vacumn. As indicated by engineer Carus on 25 aug. 1989 in a telephone conversation, a special relief valve in the tank precludes vacumn pressure to exceed this amount. Accordingly, this is considered acceptable.

4. Calculation of vertical load to piles yielded approximately 22 tons per pile. The pile designed by Capacete & Martin engineers has a capacity of 25 tons. According to AWWA

standards a safety factor of 2 must be provided for all direct vertical loads including wind forces. In a telephone conversation of 11 september, 1989 with Engineer Jose Acosta from Capacete & Martin the working load capacity of these piles have a safety factor of 2 according to the soil study. Therefore, this is acceptable.

Cordially,

Rafael Negron Romano, PE

APPENDIX C

CORROSION LITERATURE

CHAPTER 5.1

Formulation of Corrosion Resistance Charts

The Corrosion Resistance Charts presented here have been prepared with the intention of assisting the piping specifier or user by narrowing the field of piping materials to those which are suitable for his specific application. Any table of this type should be used only as a guide as it is extremely difficult, and at times, even impossible to duplicate actual operating conditions in order to accurately establish the suitability of a material of construction.

In the table presented, all of the corrodents are assumed to be chemicals in solution in the pure or concentrated state unless indicated otherwise. A designation of "S" is used to indicate that the piping material can be used satisfactorily, and a designation of "U" is used to indicate that the piping material should not be used. It must be remembered that actual operating conditions may have an effect on the interaction of the corrodent and piping material, thus it is advisable to conduct field tests, if possible.

Metallic piping materials have been considered satisfactory when the corrosion rate is less than 0.02-inch penetration per year. The brass listed in the charts is red brass, and the bronze is commercial bronze.

Glass reinforced polyesters and epoxies present a problem when a chart of this nature is prepared. As can be seen from the sections dealing with these piping systems there are many formulations of polyester and epoxy resins. Each of these formulations has its own properties of corrosion resistance. Had the attempt been made to indicate the suitability of each formulation of these resins, the charts would have become too unwieldly and confusing. Consequently, these categories have been consolidated to one single heading for the polyester resins and a single heading for the epoxy resins. As long as there is a resin formulation compatible with a specific corrodent, it is so indicated. Furthermore, this specific resin must also be available in a piping system on a standard basis. Do not be confused by other tables which may indicate that a *particular* or *specific* polyester or epoxy pipe is unsuitable when in contact with a corrodent which this chart indicates to be satisfactory. Most tables deal only with one specific resin formulation, which may be indicated as unsuitable while some other resin formulations would be termed satisfactory.

The same type of consideration used in the charts for the thermosetting resins is also employed for rubber lined pipe. There are many formulations of rubber, both synthetic and natural. As long as there is a standard formulation available for use in a piping system handling a specific corrodent, a satisfactory rating has been established.

Resistance data is presented at various temperatures in degrees Fahrenheit. Where data is available the corresponding notation of suitability for service has been entered. Absence of an entry indicates that test data is not available. The material may or may not be suitable at that temperature or at higher temperatures.

In the portion of the charts dealing with the thermoplastic materials it will be noted that there are test results indicating suitability of particular plastics at temperatures in excess of the rated operating temperatures of the corresponding solid plastic piping systems. These charts have been compiled to show the compatibility of these materials with various corrodents. Some of the thermosetting plastic materials are available as linings in metallic pipes. Under these conditions the maximum allowable operating temperatures are greater than in the corresponding solid plastic piping system.

CHAPTER 5.2

Corrosion Resistance Charts

The individual charts are planned to permit easy, preliminary evaluation of the suitability of the various piping materials to resist attack by specific corrodents. Specific fluids to be transported are found in the left-hand column, while the various piping materials are located across the top of the page. Because of the number of pipe materials, each grouping occupies four pages and metallic, plastic, and miscellaneous materials have been grouped together for easy evaluation.

CHART OF CORROSION RESISTANCE – 1

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect s

* = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Durifon
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	
Acetaldehyde	S	S	S	S	S	S	S								S	S				S	S	S			
Acetamide																									
Acetate solvents, crude																									
Acetate solvents, pure																									
Acetic acid, glacial	S	S	S	U	S	S				S	S	S	S	S	S	S	S	S	S	S	S	S			
Acetic acid, 80%	S	S	S	U	S	S	F			S	S	S	S		S	S	S	S		S	S	S			
Acetic acid, 50%	S	S	S	U	S	S	S			S	S	S	S		S	S	S	S	S	S	S	S			
Acetic acid, 20%	S	S	S	S	S	S	S			S	S	S	S		S	S	S	S		S	S	S			
Acetic acid, 10%	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S		S	S	S			
Acetic anhydride	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			
Acetone	S	S	S		S	S	S			S	S	S			S	S	S			S	S	S			
Acetone, 50% water																									
Acetonitrile	S	S	S		S	S														S	S				
Acetophenone	S	S	S	S	S	S	S	S	S	S	S	S			S	S	S			S	S	S	S	S	
Acetyl chloride	S	S			S	S	S													S	S	S			
Acetylene	S	S	S	S	S	S	S	S	S	S					S					S	S	S	S	S	
Acrylonitrile	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			

CHART OF CORROSION RESISTANCE – 2

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect serviceabi

* = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Duriron	Nicke	
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	70	70	140
Allyl chloride										S	S	S								S	S	S			S	S	S
Alum	U	U	U	U	S																				S		
Alum, ammonium																											
Alum, chrome	S				S																						
Alum, potassium																											
Aluminum ammonium sulfate																											
Aluminum chloride	U	U	U	U	U	U	U	U	U	S	S	S	S	S						S	U				S	F	
Aluminum fluoride	U	U	U	U	U	U	U	U	U											U	U	U	U	U	U	S	
Aluminum hydroxide	S				S															S					S	S	
Aluminum nitrate	S				S															S					S		
Aluminum oxychloride																											
Aluminum potassium sulfate																				S	S	S					
Aluminum sulfate	S	S	S	S	S	S	S			S	S	S			S	S	S	S		S	S	S			S	S	S
Aluminum sulfuric acid, 40, 70, 95%																											
Ammonia (anhydrous)	U	U	U	U						S	S	S	S	S	S	S	S	S	S								
Ammonia gas	U	U	U	U	U	U	U	U																			
Ammonium acetate	S	S	S	S	S	S	S			S	S	S								S	S	S			S	S	S
Ammonium bicarbonate	S	U	U	U	S	S	U	U																	S		
Ammonium bifluoride															S	S	S	S	S						U		

CHART OF CORROSION RESISTANCE – 3

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect serviceability

* = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Duriron	Nickel		
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	70	70	140	200
Ammonium bromide, 5%	S	U	U	U	S	S	S			S	S	S			S	S	S			S	S	S			U			
Ammonium carbonate	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S		
Ammonium chloride	U	U	U	U	U	U	U	U	U	S	S	S			S	S	S			S	S	S			S	S	S	S
Ammonium citrate										S	S	S			S	S	S											
Ammonium fluoride, 25%	U	U	U	U	S	U	U	U	U						S	S				S	U	U	U	U	U	S	S	S
Ammonium fluoride, 10%	U	U	U	U	S	U	U	U	U	S	S	S			S	S	S			S	U	U	U	U	U	S	S	S
Ammonium hydroxide	S	S	S		S	S	S													S	S	S			S	U	U	U
Ammonium hydroxide, 25%																									S			
Ammonium hydroxide, 10%																									S			
Ammonium metaphosphate	S				S					S					S					S					S	S		
Ammonium nitrate	S	S	S	S	S	S	S	S	S	U	U	U	U	U	S					S	S	S			S	U	U	U
Ammonium perchlorate (15–20%)															S	S												
Ammonium persulphate	S	S	S	S	S	S	S			U	U	U	U	U						S	S	S			S	U	U	U
Ammonium phosphate	S				S															S	S	S			S			
Ammonium sulfate	S	S	S	S	S*	S*	S*			S					S	S	S	S	S						S	S		F
Ammonium sulfide	S	S	S	S	S	S	S													S	S	S						
Ammonium sulfite	S	S	S	S	S	S	S																			U	U	U
Ammonium thiocyanate										S	S	S			S	S	S			S	S					S		
Amyl acetate	S	S	S	S	S	S	S	S		S	S	S			S	S	S	S		S	S	S	S		S	S	S	S

CHART OF CORROSION RESISTANCE – 4

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect serviceability

• = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Durlron	Nickel		
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	70	70	140	200
Amyl alcohol	S				S																				S			
Amyl chloride	S	S	S•		S	S•				S	S	S			S					S	S				S	S	S	S
Aniline	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S
Aniline hydrochloride	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U						S	F		
Anthraquinone	S	S	S	S	S	S	S			S	S	S			S	S	S	-		S	S	S			S	S	S	S
Anthraquinone sulfonic acid										S					S										S	S		
Antimony trichloride	U	U	U	U	U	U	U	U	U	S	S	S			S										S	S	S	S
Aqua regia	U	U	U	U	U	U	U	U	U						U	U	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic acid	S	S	U	U	S	S	S			S	S	S			S	S	S			S	S	S			S			
Aryl sulfonic acid																												
Barium carbonate	S				S					S	S	S	S	S	S	S	S	S	S	S					S	S	S	S
Barium chloride	U	U	U	U	S	S	S			S	S	S			S	S	S								S	S		
Barium hydroxide	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S		
Barium nitrate	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S			S			U
Barium sulfate	S	S	S	S	S					S										S	S	S			S	S	S	S
Barium sulfide	S	S	S	S	S	S	S													S	S	S			S	S		
Beer	S	S	S		S	S																				S		
Beet sugar liquors	S				S																							
Benzaldehyde	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S

CHART OF CORROSION RESISTANCE – 5

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect serviceability

• = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Durlron	Nickel		
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	70	70	140	200
Benzene, benzol	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	
Benzene sulfonic acid, 10%					S					S	S	S			S	S	S			S	S				S	S		
Benzoic acid	S	S	S	S	S	S	S	S	S	S										S	S	S	S	S	S	S	S	S
Benzyl alcohol	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S
Benzyl chloride	S	S	S	S	S	S	S			S	S	S								S	S	S			S	S	S	S
Bismuth carbonate																												
Black liquor															S	S	S	S	S	S	S	S						
Bleach 12.5% active Cl_2															S	S												
Borax	S	S	S		S	S																			S	S		
Boric acid	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				S	S	S	S
Brine, acid																									S			
Bromic acid																										U	U	U
Bromine, liquid	U	U	U	U	U	U	U	U	U																U			
Bromine water saturated	U	U	U	U	U	U	U	U	U																U			
Bromine water	U	U	U	U	U	U	U	U	U																U	U	U	U
Butadiene	S				S															S					S	S		
Butane	S				S					S	S	S	S		S	S	S	S		S					S	S		
Butyl alcohol	S				S					S					S					S					S	S		
Butyl alcohol, primary	S				S					S					S					S					S	S		

CHART OF CORROSION RESISTANCE – 6

S = Satisfactory U = Unsatisfactory F = Discoloration but does not affect serviceability

• = Subject to pitting

	Type 304/347 Stainless Steel				Type 316 Stainless Steel					Hastelloy B					Hastelloy C					Type 20Cb3 Stainless Steel					Duriron	Nickel		
Temperature, °F	70	100	150	212	70	150	212	300	400	70	150	200	250	300	70	150	200	250	300	70	125	212	300	400	70	70	140	200
Butyl alcohol, secondary	S				S					S					S					S					S	S		
Butyl alcohol, tertiary	S				S					S					S					S					S	S		
Butyl acetate	S				S					S	S	S			S	S	S			S					S	S		
Butyl acrylate																												
n-Butylamine																												
sec-Butylamine																												
tert-Butylamine																												
Butyl bromide																												
Butyl chloride	S				S					S	S	S	S	S	S													
Butylene																												
n-Butyl mercaptan	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S	S	S	S	S				S	S	S
Butyl phenol	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S
Butyl phthalate	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S
Butyne diol																												
Butyric acid	U	U	U	U	S	S	S			S	S	S	S	S	S	S	S	S	S	S	S	S			S	U	U	U
Calcium bicarbonate	S	S	S	S	S	S	S			S	S	S			S	S	S			S	S	S			S	S	S	S
Calcium bisulfate	U	U	U	U	S																					U	U	U
Calcium bisulfide																												
Calcium bisulfite	S				S	S	S	S							S					S	S	S	S		U	U	U	U

APPENDIX D
TANK COATING SPECIFICATION

PROJECT PK 88016
TANK FARM PM-8 (WASTE TANKS)

SECTION 09820
CHEMICAL RESISTANT COATINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Finish painting of waste tanks (exterior) and tank bridges including railings and tow plates.

1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in the manufacturer's original, sealed containers with the labels identifying the type and color intact and legible.

B. Store materials and tools in a dry area approved by the Owner. Keep the space neat and clean. Protect the floor from drippings. Take necessary precautions to prevent fire.

1.03 JOB CONDITIONS

A. Environmental Requirements

1. Comply with manufacturer's recommendations as to temperature and humidity at which coatings and coating systems can be applied.

2. Do not apply finish in areas where dust is being generated.

B. Protection

1. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

2. Observe personnel protective warnings and procedures recommended by manufacturer.

PART 2 - PRODUCTS

2.01 COATINGS

A. Manufacturers

Glidden

B. Finish colors will be selected by the owner from his standard color system. Each coat shall have a slight variation in color to identify it from the preceding coat.

2.02 COATING TYPES

A. Apply coatings in systems as shown in Article 3.04. Do not mix systems. All systems in each Project must be by the same manufacturer.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Remove foreign substances from the surface. Do not apply coating until surfaces have been approved by owner.

3.02 APPLICATION

A. General

1. Apply coatings leaving no sags, laps, brush marks, or other defects. Cut each coat into a true line.

2. Do not apply initial coating until moisture content of surface and weather are within limitations recommended by paint manufacturer. Test with moisture meter.

B. Thickness: Mils specified are dry film thickness. (One mil equals 0.001 inch).

C. Equipment: Equipment shall be maintained in good working order as recommended by the coating manufacturer.

D. Mixing: Mix and thin in accordance with the manufacturer's printed instructions.

E. Inspection

1. Do not apply additional coats until completed coat has been inspected by the Owner.

2. Only inspected coats will be considered in determining number of coats applied.

3.03 CLEANING

A. At the completion of this work and after other trades are finished, remove from finished surfaces misplaced paint spots, and restore finishes of affected items. Remove surplus material, containers, and debris from the premises.

3.04 COATING SCHEDULES

A. Coats specified in this section are in addition to shop coats specified in other sections. See also the room finish schedule drawing.

B. Number of coats and mil thickness specified must be obtained.

C. PAINT SYSTEMS

E1 - Waste Tanks (Exterior), Tank Bridges including railings and toe plates

1st Coat: Glid-Guard Epoxy Chemical Resistant Finish No. 5240 3.0

END OF SECTION

APPENDIX F

SECONDARY CONTAINMENT DRAWING -

APPENDIX G
SECONDARY CONTAINMENT COATING MSDS

MAZER® CHEMICALS
A Division of PPG® INDUSTRIES, INC. Chemicals Group
MATERIAL SAFETY DATA SHEET
Emergency Phone No. (312) 244-3410

PRODUCT INFORMATION

Trade Name: MASIL® 292
Name and/or Family or Description: WATER REPELLANT
Address: 3938 Porett Drive, Gurnee, Illinois 60031

DOT Hazard Classification: NON-HAZARDOUS
DOT:
NFPA:HEALTH HAZARD-0-NORMAL MATERIAL; FLAMMABILITY-1-ABOVE 200 DEG F.; REACTIVITY-0-STABLE

CAS NUMBER:	63148-62-9
RCRA HAZARD CLASS: (IF DISCARDED)	D001
EPA PRIORITY POLLUTANTS	NONE

HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	TLV (UNITS)	APPROX %
STODDARD SOLVENT	100 ppm	30

As established by the American Conference of Governmental Industrial Hygienists and/or standards promulgated by the Occupational Safety and Health Administration.

PHYSICAL DATA

Physical Data:	
BOILING POINT, °F	168
SOLUBILITY IN WATER @ 25°C	INSOLUBLE
SPECIFIC GRAVITY @ 25°C	0.98
VAPOR PRESSURE, mm Hg @ 25°C	<74
VAPOR DENSITY, (AIR=1)	~5
VOLATILES, %, BY VOLUME	~30
APPEARANCE @ 25°C	PALE YELLOW LIQUID
ODOR	HYDROCARBON
FLASH POINT, PMCC, °F	122

FIRE AND EXPLOSION HAZARD DATA

Flash Point: (See PHYSICAL DATA section)
Flammable Limits in Air, % by Volume: Unknown LOWER: Undetermined UPPER: Undetermined
Extinguishing Media: Use Carbon Dioxide or Dry Chemical on small fires. Use foam (alcohol, polymer or ordinary) and water spray for large fires.
Special Fire Fighting Procedures: Self-contained breathing apparatus and protective clothing should be worn in fighting fires involving chemicals.
Unusual Fire & Explosion Hazards: None Known to Mazer Chemicals.

Technical bulletin

MAZER CHEMICALS, INC.
3938 PORETT DRIVE
GURNEE, ILLINOIS 60031
TEL: (312) 244-3410 TELEX: 25-3310
CABLE: MAZCHEM GURNEEILL

mazer

MASIL 292
WATER REPELLANT

GENERAL STATEMENT :

MASIL 292 is a silicone resin, water repellent that will extend the life and preserve the appearance of above ground masonry. It protects against cracking, spilling, efflorescent and damage caused by water entering the masonry.

APPLICATIONS :

MASIL 292 water repellent should be diluted to 5 percent silicone active solids with mineral spirits or kerosene. For example, for a 5 percent active solution, use the following ratios : 3.6 gallons of MASIL 292 and 50 gallons of mineral spirits. The repellent solution should be applied using a low pressure spray gun held close to the masonry with overlapping passes. The MASIL 292 solution should be applied liberally enough that it will run down 6 to 12 inches on the masonry. One (1) gallon of MASIL 292 repellent, when diluted to 5 percent active solids, will cover between 75 and 150 square feet, depending on the porosity of the surface. For most surfaces, a single application is sufficient, however, on porous surfaces, a second coat is recommended. Allow several several hours before application of the second coat.

HANDLING AND STORAGE :

MASIL 292 should be applied in a well ventilated area. Keep away from fire and avoid breathing the spray mist. Solvent respirators should be worn when large areas are to be sprayed. Foliage, shrubs, grass and other plant growth should be protected from the product's spray.

SALES SPECIFICATIONS

SOLIDS,% @ 105 C, 1.5 HRS.	65 TYPICAL
APPEARANCE @ 25 C	CLEAR LIQUID

PACKAGING

CLOSED HEAD STEEL DRUM	440 / LB net weight

This product is also available in bulk and 5 gallon pail quantities

HEALTH HAZARD DATA

Threshold Limit Value: See HAZARDOUS INGREDIENTS section
Effects of Overexposure: Contact with skin or eyes may cause temporary irritation.
Emergency and First Aid Procedures: Flush eyes with copious amounts of water for a minimum of 15 minutes. Wash contacted skin areas with soap and water. If irritation develops, consult a physician. Soaked clothing should be changed immediately!

REACTIVITY DATA

Stability: Stable [X] Unstable [ ]
Incompatabilities: (Materials to Avoid) Stong oxidizing material can cause a reaction.
Hazardous Decomposition Products: Thermal decomposition or burning may produce carbon mono/dioxides and/or silicone oxides.
Hazardous Polymerization: May occur [ ] Will not occur [X]
Conditions to Avoid: Not applicable

SPILL, LEAK AND DISPOSAL PROCEDURES

Action to take for spills: (Use appropriate Safety Equipment) Use absorbent material to collect and contain for disposal. Contain large spills and pump into a suitable tank. Wash area with suitable detergent and thoroughly rinse.
Disposal Method: All Local, State and Federal Regulations concerning health and pollution should be reviewed to determine approved disposal procedures.

SPECIAL HANDLING INFORMATION

Ventilation:
1. Local Exhaust: None should be needed
2. Mechanical (general): Recommended
3. Respiratory Protection (type): Canister Type GMA (Mine Safety Appliance Co.) (If needed)

Protective Clothing: Clean, body-covering clothing. In addition, rubber gloves, boots, and apron, depending upon the exposure likely, or as required by your company.
Eye Protection: Chemical Workers Goggles recommended.
Other Protective Equipment: Eye Fountain and Safety Shower in work area.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Store in well ventilated areas at temperatures below 120°F

PROJECT PR 88016
TANK FARM PM-8

SECTION 07175
LIQUID WATER REPELLENT CONCRETE COATING

PART 1 - GENERAL

1.01 RELATED WORK

A. Section 03300 - Concrete.

1.02 QUALITY ASSURANCE

A. Test Panels

1. Provide a test application on each surface to be treated to insure compatibility and desired waterproofing results.

2. Use panels to determine final application rate and procedures.

3. Apply test panels using the same equipment as for job application.

4. Test panels shall be available for the Owner's inspection throughout job application.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in sealed containers clearly marked with the manufacturer's identification including the type of materials, and with the manufacturer's numbered seal intact.

B. Store materials in area protected from rain or standing water, where temperatures are not less than 40°F. or over 120°F., in well ventilated area unless otherwise authorized by manufacturer. Keep away from extreme heat.

1.04 JOB CONDITIONS

A. Environmental Requirements:

1. Do not proceed with application if ambient temperature or surface temperature exceeds 100°F.

2. Do not proceed with application of materials in rainy conditions. Material may be applied to damp but absorbent substratos, but not over standing water. The surface should be sufficiently dry to observe the spray pattern during application.

PART 2 - PRODUCTS

2.01 LIQUID WATER REPELLENT

A. Masil 292, as manufacturer by Mazer Chemicals, Inc., Gurnee, Illinois - Division of PPG.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Surface cracks and voids of more than 1/16" should be patched prior to application of water repellent. Place and cure sealants prior to application.

B. Clean concrete surface of surface dirt, dust, oil or other surface contaminants. Use proprietary concrete cleaning compounds where necessary followed by thorough rinsing with water. Surface to be treated may be damp with no standing water to assure good penetration of water repellent.

3.02 APPLICATION

A. Apply water repellent in accordance with manufacturer's written instructions.

B. When applying Masil 292, protect adjoining metal and painted surface from overspray and splash of water repellent. Remove inadvertent splashes using mineral spirits before the solution has dried on the surface.

C. Protect asphalt-based materials from overspray.

D. Protect surfaces sprayed with Masil 292 from rain for 6 hours following application.

E. Wear protective clothing and eye protection as recommended by manufacturer.

3.03 CLEAN-UP

A. Remove waste materials, rubbish and debris from site and legally dispose of them off Owner's property.

B. Leave work areas in a clean condition.

END OF SECTION

APPENDIX H

SECONDARY CONTAINMENT COATING EVALUATION

Lilly

Eli Lilly and Company

Lilly Corporate Center
Indianapolis Indiana 46285
(317) 276-2000

Verify & Give Comments 92023 File

February 6, 1992

Mr. Dennis Zawodni, Chief
Enforcement Section
Mr. Vic Windle, Chief
Permits Section
Solid and Hazardous Waste Management
Indiana Department of Environmental Management
105 South Meridian Street
P.O. Box 6015
Indianapolis, Indiana 46206-6015

Gentlemen:

Re: Compatibility/Effectiveness Testing of Concrete Sealers and Coatings

Your department has requested that Eli Lilly and Company ("Lilly") provide evidence of compatibility and effectiveness for sealers and coatings used on concrete external liner secondary containment structures at various Lilly facilities. Attached is a report documenting that Masil® 292 and Ceilcrete® 695 are effective and compatible for typical Lilly primary waste (worst case application).

Current federal and state regulations do not require "external liner" secondary containment systems as defined in 329 IAC 3-24-4 and 3-49-4 to include an "impermeable interior coating" (unlike the regulatory requirements for a "vault" secondary containment system which do specify an "impermeable interior coating or lining" *see* 329 IAC 3-49-4(e)(2)(D)). However, Lilly does believe it is prudent in most cases to provide a sealer or coating for the additional protection of the concrete structure.

No standard method of compatibility and/or effectiveness testing is currently available. Therefore, Lilly developed the method described in the enclosed report and contracted with ATEC and Associates, Inc, an independent testing firm, to conduct the tests. As described in ATEC results (Attachment 2 of the report) the test method provides not only numerical data to support the question of compatibility/effectiveness, but also, by taking cross-sectional slices of the concrete, visual information on the extent and mechanism of waste penetration.

The numerical data clearly shows the difference between the level of solvent absorbed by the concrete cubes treated with Masil® 292 and Ceilcrete® 695 and the untreated cubes. The numerical data also demonstrates waste compatibility in that, even after waste exposure of seven (7) days, both products continued to perform as an effective barrier.

Visual observations of coated cross-sectional slices performed by ATEC revealed very little or no waste penetration through the top face of the cube (the cubes finished surface). The majority of the solvent entering the treated cubes, did so through the rougher, unfinished side and bottom faces of the cube. In secondary containment systems, all surfaces which will be in contact with waste are finished surfaces. Lilly believes the test method is useful in determining effectiveness and compatibility and intends to utilize the method in the future when considering other coatings or sealants.

Lilly hopes the enclosed information will adequately addresses your concerns. If you have any additional questions or comments, please do not hesitate to call me at 276-1815.

Sincerely,

ELI LILLY AND COMPANY

Thomas E. Hein
Environmental Engineer
Corporate Environmental Affairs

Attachments

bcc: Joan Heinz
Don Brannon
Ron Pitzer
Israel Delgado
Dean Riffert
Jeff Brown
Judy Tempel
Carol Ertl
Brenda Pfister

Eli Lilly and Company

Documentation of Compatibility

Masil® 292; Ceilcrete® 695

and

Primary Waste
from
Clinton and Tippecanoe Laboratories

January, 1992

I. Introduction

Eli Lilly and Company (Lilly) facilities routinely utilize Masil® 292 and Ceilcrete® 695 in conjunction with a concrete external liner system (e.g., a concrete floor or wall) for secondary containment meeting the requirements of 40 CFR 264.193 and 265.193 (329 IAC 3-24-4 and 3-49-4). This report documents the effectiveness of Masil® 292 and Ceilcrete® 695 as a concrete sealer or coating and by showing that Masil® 292 and Ceilcrete® 695 do not disintegrate over long periods of time, this report also documents the compatibility of Masil® 292 and Ceilcrete® 695 with typical primary wastes from Tippecanoe Laboratories and Clinton Laboratories.

II. Background

The secondary containment system most utilized at Lilly facilities for RCRA regulated tank systems is an "external liner" consisting of concrete with some form of coating or concrete sealer (Masil® 292 or Ceilcrete® 695) applied regularly or according to the manufacturers recommendations.

External liners, when used as secondary containment systems for RCRA regulated tanks, must be: 1) constructed of or lined with materials that are compatible with the wastes(s) to be placed in the tank system (40 CFR 264.193 (c)(1) and 165.193 (c)(1)) and, 2) capable of preventing lateral as well as vertical migration of the waste (40 CFR 264.193 (e)(1)(iv) and 265.193 (e)(1)(iv)).

Because no standard method for testing the compatibility or effectiveness of concrete coatings or sealers exists, Lilly has developed a procedure with the concurrence of the Indiana Department of Environmental Management to show compatibility and effectiveness. A copy of the procedure is contained in Attachment 1.

Lilly contracted with ATEC and Associates, Inc., an Indianapolis, Indiana concrete and soils testing company to conduct the tests on Masil® 292 and Ceilcrete® 695. Typical primary waste from Lilly's Tippecanoe Laboratories and Clinton Laboratories were provided to ATEC and used in the testing. Primary wastes used in the tests were analyzed to identify the contents. The results of the analyses are contained in Attachment 2.

III. Test Results

The compatibility test results demonstrate that both Masil® 292 and Ceilcrete® 695 are compatible with primary waste and are an effective barrier to waste penetration into the concrete for up to 7 days (172 hours). Since the waste will typically be in contact with the secondary containment system 24 hours or less (40 CFR 264.193(c)(4)), both Masil® 292 and Ceilcrete® 695 are deemed to meet the requirements of 40 CFR 264.193(b) and (e)(1) and 265.193(b) and (e)(1).

Visual examination of cross-sections of treated cubes revealed that even after 7 days, "very little or no solvent penetration," had occurred on the upper face, or finished surface of the cube. Since all secondary containment surfaces in contact with waste are finished, the visual observations of upper face of the cube is most relevant to Lilly's secondary containment structure.

The weight gain testing results and conclusions are documented in a letter to Lilly from ATEC and Associates, Inc., dated January 31, 1992 (Attachment 3). The attached Graph Nos. 1, 2, 3 and 4 depict ATEC data of weight gain versus time of concrete cubes coated with Ceilcrete 695® and Masil® 292 and submerged in typical primary waste from Tippecanoe Laboratories and Clinton Laboratories.

The ATEC report discusses the honeycombing and roughness phenomenon of all unfinished surfaces and specific honeycombing phenomenon of Cubes T-4 and C-2 used in the Masil® 292 tests. Since all surfaces in contact with waste are finished, the observations of the honeycombed and rough concrete will not be present in seccndary containment external liners in contact with wastes. For this reason, the visual observations aspect of the test method is judged to be more beneficial in predicting coating/sealer effectiveness in secondary containment systems.

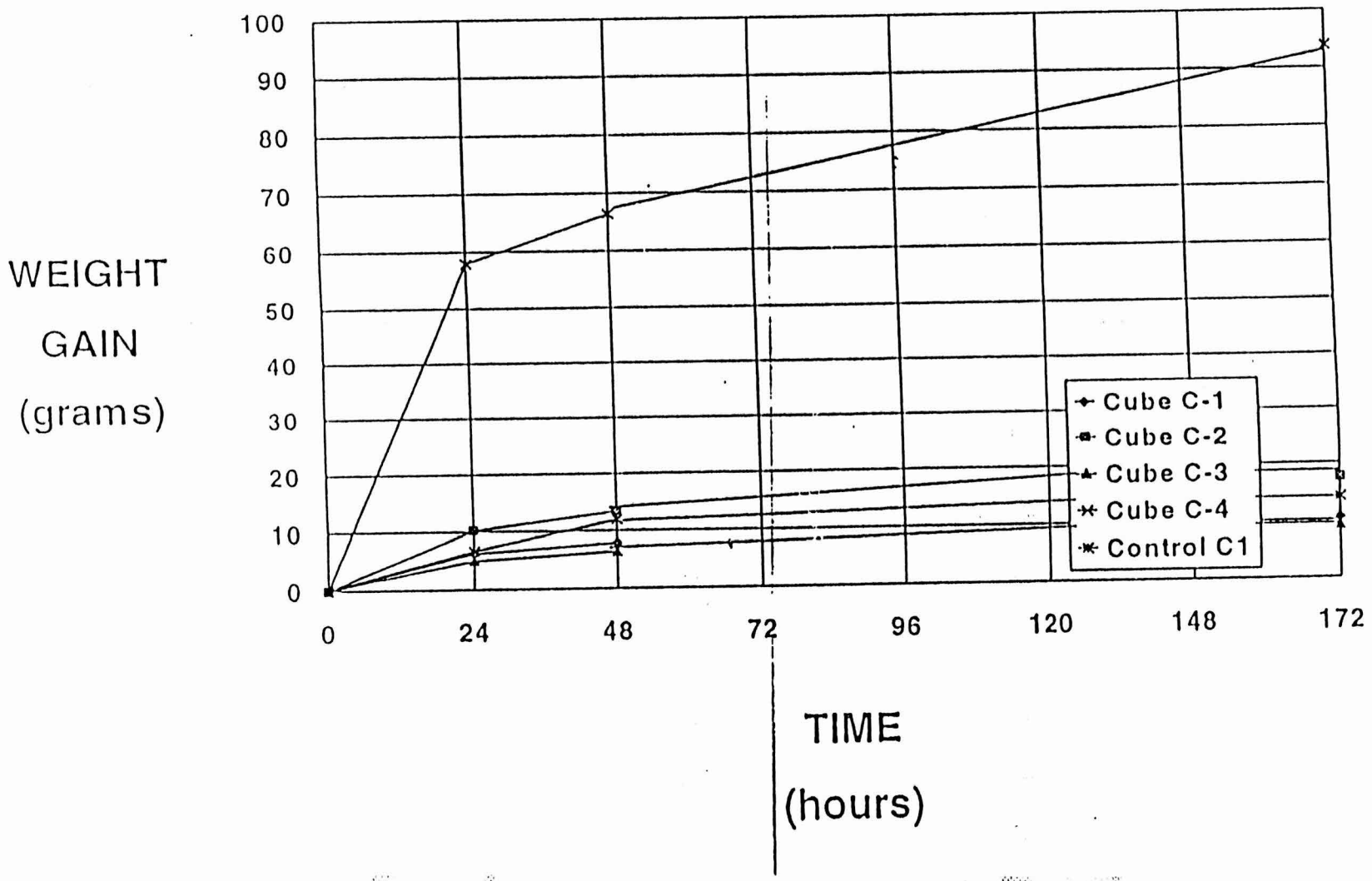
The honeycombing observations emphasize however, the importance of adhering to strict quality assurance/quality control procedures during concrete placement and finishing. Because Cubes T-4 and C-2 used in the Masil® tests do not meet Lilly specifications, they are excluded in determining compatibility/effectiveness.

Graph 1

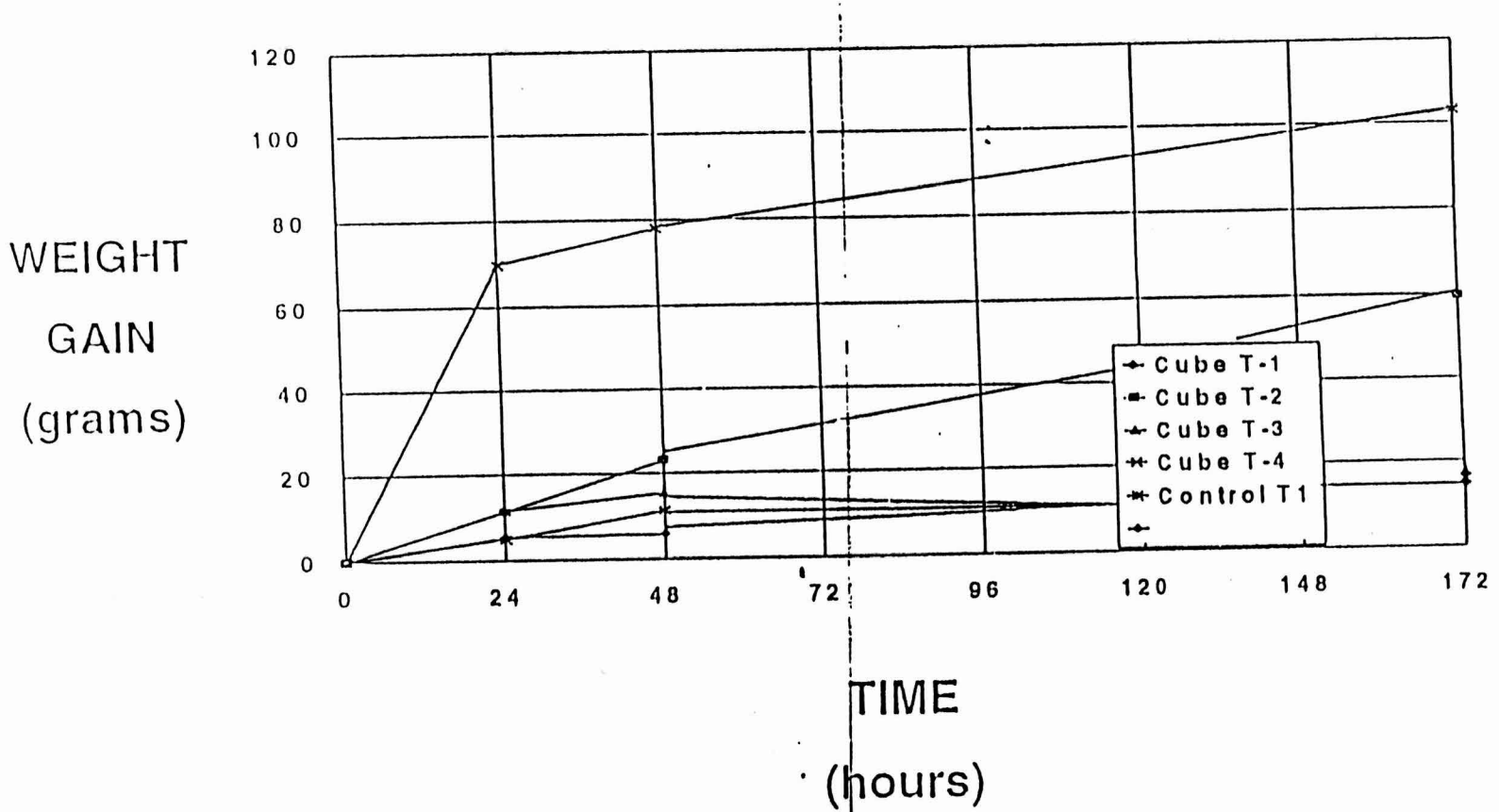
Ceilcrete® 695 Compatibility Tests

Clinton Laboratories Waste

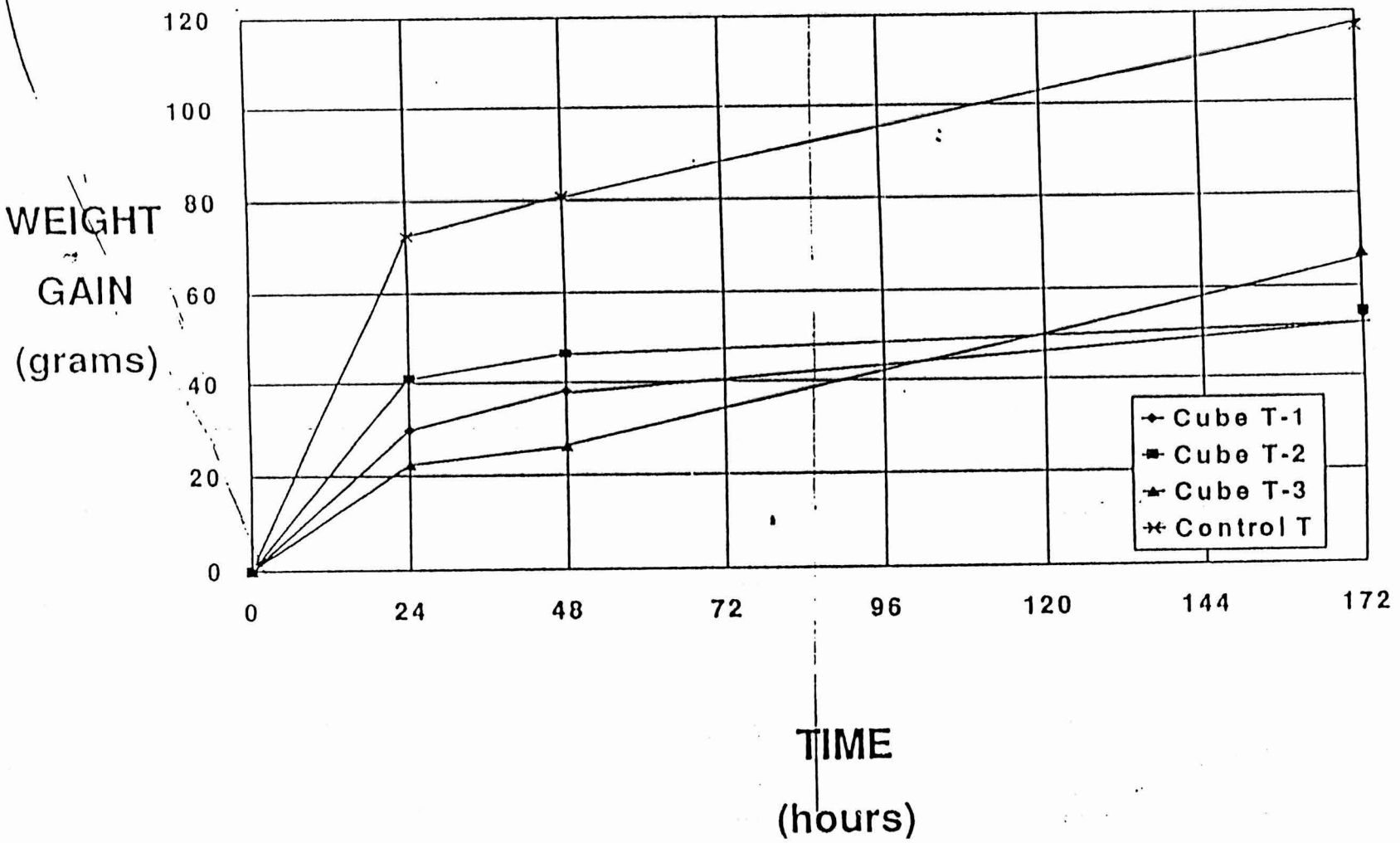
January/1992



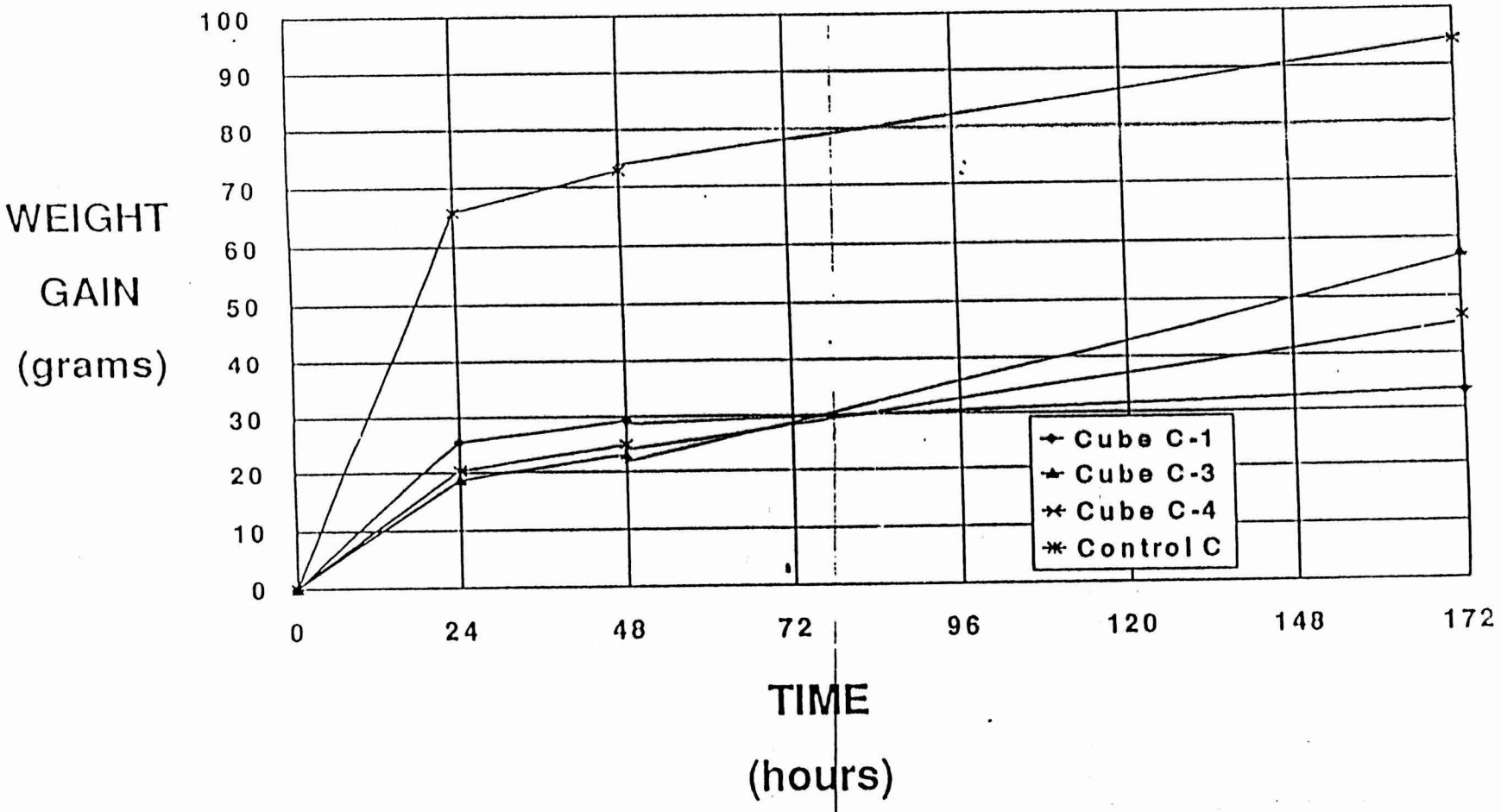
Graph 2
Ceilcrete® 695 Compatibility Tests
Tippecanoe Laboratories Waste
January/1992



Graph 3
Masil® 292 Compatibility Tests
Tippecanoe Laboratories Waste
January/1992



Graph 4
Masil® 292 Compatibility Tests
Clinton Laboratories Waste
January/1992



ATTACHMENT 1

Test for the
Verification of Compatibility and Permeability
Concrete Coatings and Sealants

1. Four-inch cubes will be cast using either a replicate of the original ready-mix concrete or a simulated laboratory concrete.

2. The cubes will be cured or saturated in water for seven days, and air dried for 21 days. A statistically adequate number of cubes will then be coated with the selected sealer per the manufacturer's recommendation and air dried for 14 days. At least one cube will not be coated and will be designated as the control cube.

3. All cubes will be weighed before testing to determine weight gain from exposure to solutions representative of primary waste. The cubes will be fully immersed in the solution. Weight gain will be determined after 24-hour, 48-hour and 7-day exposure. If specimens will not be immediately weighted after the immersion test, they will be frozen to prevent evaporation of volatiles.

4. Freshly broken or cut surfaces perpendicular to the exposed surfaces will be subjected to simplistic indicator tests to possibly determine penetration of the sealer, the solution, and carbonation. Suggested indicators are methylene blue, fluorescent dye and phenophthalein. Various indicators will also be tried on sealed and unsealed unexposed specimens to determine if they can be used in a confirmatory test for the presence of the sealer.

5. A way to prove that a sealer has been applied uniformly to the concrete may be the inclusion of a dye in the sealer before application. If dyes are used, they will be tested for permeance both under normal weathering and on exposure to the solvents.

ATTACHMENT 2

TIPPECANOE LABORATORIES
PRIMARY WASTE CHARACTERIZATION
SAMPLE DATED AUGUST 13, 1991

Compound Name	Final result %w/w
Acetone	13.53
Allyl alcohol	0.10
Amyl Acetate	0.35
Amylene	0.21
Butyl Bromo Butyrate	0.02
Butylchloride	0.40
Diacetone Alcohol	0.15
Diethylaniline	0.27
D iethyl benzene	0.09
Dimethylformamide	0.97
Ethanol	0.75
Ethyl Ether	0.52
Ethyl Acetate	6.28
Ethylene Dichloride	0.19
Hexane	0.51
Isobutanol	0.06
Isobutyl acetate	0.08
Isopropanol	0.49
Isopropyl acetate	1.14
Methanol	29.22
Methyl acetate	0.24
Methylene Chloride	12.86
Pentane	0.05
Quinoline	0.08
Tetrahydrofuran	1.18
Toluene	3.82
p-Xylene	0.86
m-Xylene	0.11
p-CBT	0.03
Total VOC's	74.6
% water	20.15
% Non-vol res.	4.58
Total %	99.3

CLINTON 3RD QUARTER 1991 RCRA PRIMARY

Compound Name	Final result %w/w
	2.18
Acetone	0.63
Acetonitrile	0.66
Amyl Acetate	0.16
Amylene	0.48
1 Chloro 2 butanol	0.27
2 Chloro 1 butanol	1.46
Dimethylformamide	4.24
Ethanol	0.13
Ethyl Ether	2.15
Ethyl Acetate	0.54
Hexane	0.27
Isoamyl acetate	0.21
Isoamyl alcohol	1.49
Isobutanol	0.57
Isopropanol	49.62
Methanol	1.22
Methyl acetate	0.14
Methylcyclopentane	7.35
Methylene Chloride	0.06
Phenol	0.08
Pyridine	7.30
Toluene	0.22
Trifluralin	
Total VOC's	81.42
% water	10.44
% Non-vol. res.	8.12
Total %	100.0

AT[illegible]CHMENT 3

ATEC Associates, Inc.
5150 East 65th Street
Indianapolis, Indiana 46220-4871
[317] 849-4990, FAX # [317] 849-4278

Tom Hein
Environmental Affairs Division
Eli Lilly and Company, Inc.
Lilly Corporate Center 32/4
Indianapolis, Indiana 46285

January 31, 1992

Re: Cube Saturation Results and Analysis
Organic Solvents Investigation
ATEC Project #21-12329

Dear Mr. Hein:

The following data report the 1-day, 2-day, and 7-day results of the primary waste absorption of each of the two series of cubes of this investigation, the first of which was treated with MASIL-292, and the second of which was treated with a three-part Ceilcrete 695 fiberglass-reinforced polyester process.

(1) MASIL-292

—Tippecanoe Laboratories Waste—

	Start	24 hr	Cumulative Absorption	48 hr	Cumulative Absorption	7 day	Cumulative Absorption
T-1	2558.7 g	2588.3 g	29.6 g	2596.8 g	38.1 g	2612.3 g	53.6 g
T-2	2565.0	2605.9	40.9	2611.4	46.4	2619.5	54.5
T-3	2415.1	2437.4	22.3	2441.0	25.9	2482.4	67.3
T-4	2464.3	2532.3	68.0	2538.8	74.5	2544.1	79.8
T-Ctl	2489.2	2561.6	72.4	2570.0	80.8	2605.8	116.6

---Clinton Laboratories Waste---

	Start	24 hr	Cumulative Absorption	48 hr	Cumulative Absorption	7 day	Cumulative Absorption
C-1	2506.1 g	2531.7 g	25.6 g	2535.4 g	29.3 g	2539.3 g	33.2 g
C-2	2448.6	2540.8	92.2	2545.3	96.7	2573.7	125.1
C-3	2497.7	2516.4	18.7	2520.8	23.1	2555.1	57.4
C-4	2450.9	2471.3	20.4	2475.9	25.0	2497.6	46.7
C-Ctl	2458.4	2524.2	65.8	2531.1	72.7	2553.0	94.6

(2) Ceilcrete 695 Primer/Basecoat/Topcoat/Smoothing Liquid

—Tippecanoe Laboratories Waste—

	Start	24 hr	Cumulative Absorption	48 hr	Cumulative Absorption	7 day	Cumulative Absorption
T-1	2918.3 g	2923.7 g	5.4 g	2924.2 g	5.9 g	2933.0 g	14.7
T-2	2879.4	2890.9	11.5	2902.5	23.1	2939.1	59.7
T-3	2884.2	2895.8	11.6	2899.8	15.6	2901.5	17.3
T-4	2907.4	2912.3	4.9	2918.9	11.5	2923.3	15.9
T-Ctl	2533.0	2602.9	69.9	2611.0	78.0	2635.9	102.9

—Clinton Laboratories Waste—

	Start	24 hr	Cumulative Absorption	48 hr	Cumulative Absorption	7 day	Cumulative Absorption
C-1	2871.2 g	2877.4 g	6.2 g	2879.1 g	7.9 g	2881.7 g	10.5 g
C-2	2922.6	2932.8	10.2	2936.0	13.4	2940.1	17.5
C-3	2896.5	2901.4	4.9	2902.9	6.4	2905.6	9.1
C-4	2891.9	2898.6	6.7	2903.8	11.9	2906.0	14.1
C-Ctl	2601.4	2659.3	57.9	2667.9	66.5	2695.3	93.9

Our initial analysis of the MASIL-292 data suggested that the control cubes absorbed on the order of magnitude of 100 grams of waste solvent, and the treated cubes absorbed approximately half that amount, over the complete seven-day period. In each series of cubes, however, we noted that one cube from each set treated with MASIL-292 (namely, cubes T-4 and C-2 from that series) absorbed more of the solvents than did its companion cubes. This is explainable by these particular cubes (T-4 and C-2) having relatively more honeycombing than others of the set, and such honeycombing affords a passageway for the penetration of solvent into the central portion of the cube.

Further scrutiny of these (MASIL-292) cubes tends to bear out this theory. The cubes were split with a chisel, and the exposed cross-section was examined. The upper face of a cube, which had been worked while the concrete was still in its plastic state, naturally showed little or no honeycombing. The sides and bottom of the cube were not so well consolidated, and here honeycombing was quite common. This honeycombing phenomenon is not at all surprising in light of the size (4" x 4" x 4") of the specimens and the fact that, like any cast-in-place concrete structure, only the uppermost face of the specimens was accessible for finishing.

Accordingly, inspection of the cross-section of this uppermost face of the MASIL-292 treated cubes showed that very little or no solvent penetration had occurred through these faces. In honeycombed areas of the sides and bottom, however, solvent penetration had plainly occurred, and in some instances to as much as 15mm to the center of the cube. The mechanism by which the solvent penetration took place would appear to be thus:

1. Upon immersion in solvent, the solvent flows immediately into surficial imperfections of the sides and bottom (both treated and control cubes). This is supported by the observation that the cubes effervesced mildly at initial immersion.

2. In the shorter term measurements, the solvent has flowed through capillary action toward the inner part of the cube, to areas of cement and aggregate which had not been subjected to MASIL-292. Had the cubes been soaked for an extended period in MASIL-292, these areas would likely had some measure of exposure to the sealer.

3. Solvent soaks into the cement and aggregate in areas where no sealer barrier is present. This is quite a slow process, and is continuing at the end of the seven-day duration.

4. As cubes are weighed, the cube sheds its exterior solvent, and solvent oozes out of the imperfections, though at a pace on par with the pace that it flowed into the imperfections.

The control (untreated) cubes of the MASIL-292 series showed a measurable degree (perhaps 2-3mm) of solvent penetration had taken place on the upper (finished) faces of the cubes. The penetration that was evident at the sides and bottom of these cubes was more extensive, as had been observed in the treated cubes. In the control cubes, this penetration ranged from 20 to 25mm toward the center of the cubes.

The upper faces of these cubes are reasonably representative of the type of surface that would be achieved in actual construction, whether the specified finish be a hard-troweled finish or a float finish. The least-honeycombed areas of the side and bottom surfaces of these cubes offer a merely adequate representation of this type of concrete surface. Due to the severe honeycombing of the sides of cubes T-4 and C-2, however, we are inclined to treat the results from these two specimens as suspect. In any event, the uppermost surface of the cubes best simulates an actual float finish, as might be encountered in a containment basin such as that to which these sealers might be applied.

In the instance of the cubes treated with the Ceilcrete system, it appears that somewhat lesser amounts of solvent absorption took place during the test period. Upon completion of the seven-day saturation, specimen T-2 from this series displayed some minor deterioration in the form of cracking of the coating, but the coating remained bonded to the cube. Splitting of this cube revealed that some solvent migration had begun at the corner where the cracking had begun, but that this penetration had not yet found its way past the epoxy-resin primer coat. The exceptional weight gain of this cube is accountable by solvent being trapped between the fiberglass-reinforced "jacket" and the cube itself.

The control cubes to the Ceilcrete-treated series of cubes, predictably, were quite similar to those from the MASIL-292 series (that is, some penetration was evident at the smoothest surfaces, and considerable penetration at imperfectly-finished surfaces).

It can reasonably be concluded that both the MASIL-292 sealer and the Ceilcote system

provide a means of blocking the infiltration of the waste solvents into a concrete structure. It is apparent, though, that the MASIL-292 sealer is much more effective when it is applied to an unblemished surface, as would be obtained through hard-troweling. A good float finish would probably be conducive to this sealer, but a broom finish would be less appropriate. The Ceilcrete system seems quite effective regardless of the quality of the concrete surface, though the fact that it is a relatively inflexible shell makes the likelihood of eventual cracking to be some cause for concern, as once its integrity is breached, it is prone to separate from the structure that it is meant to protect. Moreover, the application of the Ceilcrete system is much more involved, especially when the treated structure presents complications with corners and vertices.

We appreciate the opportunity to be of service to you in this matter. Should you have any questions, please feel free to contact this office.

Respectfully submitted,

ATEC ASSOCIATES, INC.

Samual W. Dreyer
Engineering Assistant

James D. Calder
Field Operations Manager

APPENDIX E
TANK INTEGRITY TEST RESULTS

2.09 Ha
9.533

ELI LILLY INDUSTRIES, INC.

CALL BOX 1198 - PUEBLO STATION
CAROLINA, PUERTO RICO 00628-1198

KM. 146.7 STATE ROAD NO. 2
MAYAGUEZ, PUERTO RICO

P.O. BOX 1748
MAYAGUEZ, PUERTO RICO 00709

May 30, 1989

Mr. Carlos Ramos, P.E.
Project Engineer
Pedro Panzardi & Associates
P. O. Box 2291
Hato Rey, Puerto Rico 00919-2291

RE: **HAZARDOUS WASTES TANKS CERTIFICATION / YOUR PROJECT NO. 8944 /OUR PROJECT NO. 88016103**

Dear Mr. Ramos:

Enclosed is a copy of the hydrotest report prepared by Alonso & Carus for the three 50,000 gals waste storage tanks recently installed in our facilities.

Hope with this document we complete all submissions you requested.

Best regards,

Miguel Montalvo, P.E.
Construction Engineer

tr

enclosure

cc: Mr. Pedro Panzardi — Pedro Panzardi & Associates
Mr. José J. Rivera — Pedro Panzardi & Associates
Mr. Braulio González — Eli Lilly Industries, Inc.

ROAD 859, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

22 de mayo de 1989

Eli Lilly Industries
P.O. Box 1748
Mayaguez, PUerto Rico 00709

Att.: Eng. Miguel Montalvo

Ref.: Contract K88219
Three (3) Waste Tanks

Gentlemen:

We hereby certify that the three (3) Vertical Waste Storage Tanks, 20' dia. x 24'-3" high covered by your above referenced contract was hydrostatically tested (full of water) and the test was satisfactory.

Attached please also find certificates of Fluorescent Liquid Penetrant Test and X-rays test of the three (3) tanks.

Cordially yours,

ALONSO & CARUS IRON WORKS, INC.

NELSON BENITEZ - P.E.

lmf

2.09
1533

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

May 10, 1989

Eli Lilly Industries, Inc.
P.O. Box 1748
Mayaguez, P.R. 00709

Att: Eng. Montalvo
Ref: Fluorescent Liquid
Penetrant Test

Dear Eng. Montalvo:

The basic purpose for the NDE Inspection of the three (3) new sotrage tanks was to evaluate the general inservice condition. This nondestructive testing method is for the detection of discontinuities that are open in the weld surface area. This test is performed in strict accordance with the ASME Section V, Latest Edition.

The general appearance of the storage tank welds were proven to be in satisfactory conditions based in an average of 100% inspection. Several welding areas were detected with defects and were rejected. These welds were repaired and accepted. These repairs were performed in accordance with codified applications to maintain the original manufacturers requirements and specifications.

If you have any doubts and/or need additional information, please contact us.

Sincerely yours,

ALONSO & CARUS IRON WORKS, INC.

Wilfredo Rivera
NDE Manager Level III

cc: Eng. Nelson Benítez

ALONSO & CARUS
IRON WORKS INC.
P.O. Box 566
CATANO, PUERTO RICO 00632
(809) 788-1065

JOB 300-89

Tank #1, 2 and 3

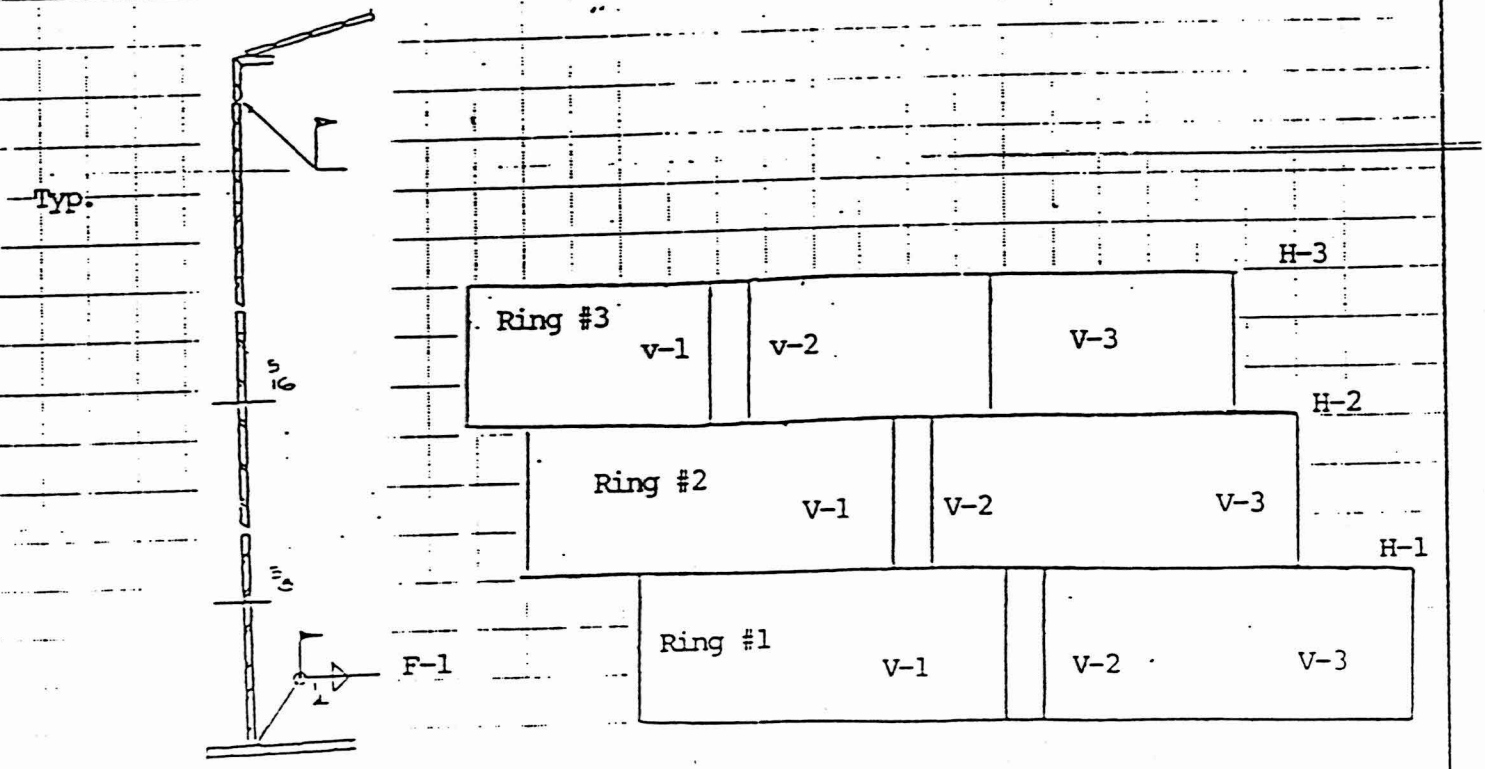
BY _____ DATE _____

CHECKED BY W. Rivera DATE 4-26,27,28 &29-89

FLUORESCENT PENETRANT TEST

ALL WELD -
V = Vertical
H = Horizontal
*F = Fillet

*Shell to bottom
double fillet tee joint



SECT AT SHELL

NO.	DATE	DESCRIPTION	NAME	NO.	DATE	DESCRIPTION	NAME

REVISIONS

ALONSO & CARUS IRON WORKS, INC.
P. O. Box 566, Catano, Puerto Rico 00632 - Phone (809) 788-1063.
Road 862 Km 0 Hm. 3, Palmas Area, Catano, Puerto Rico
TELEX NO 345004

CONTRACTOR OR OWNER	ELI LILLY INDUSTRIES, INC.
PROJECT	TANK FARM PMO. PROJ. P.R. 80016
DESCRIPTION	WASTE STORAGE TANK 20 DIA. x 24'-7" H.T.L.
PROJ. NO	P.O.
DESIGNED	E. M. C. 4-89
DRAWN	A.G.
CHECKED	J.O.
JOB No.	0429.88
DRAWING No.	

ALONSO & CARUS
IRON WORKS INC.
P.O. Box 566
CATANO, PUERTO RICO 00632
(809) 788-1065

JOB 300-89

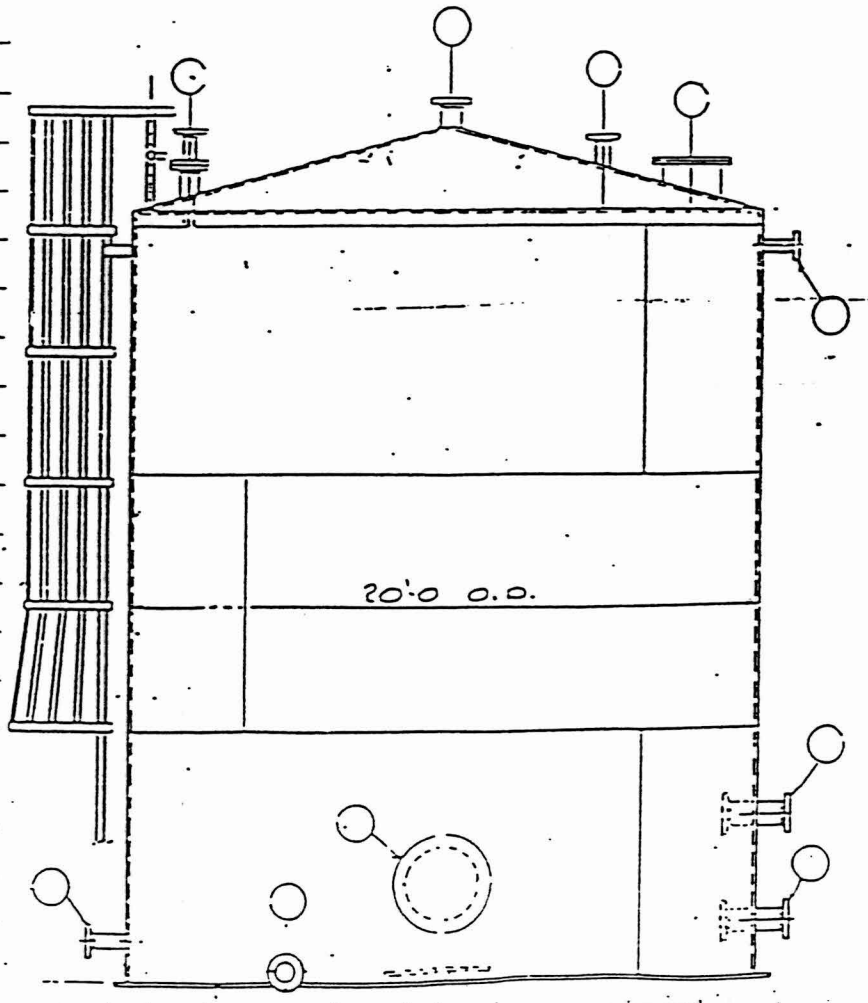
SHEET NO. Tank 1, 2, and 3 OF

CALCULATED BY DATE

CHECKED BY W. Rivera DATE 4-26,17,28, &29-8

SCALE

FLUORESCENT PENETRANT TEST



N = Nozzle
M = Manhole

NO.	DATE	DESCRIPTION	NAME	NO.	DATE	DESCRIPTION	NAME
1	12-22-88	PLATFORM HIGH	J.S.				

REVISIONS

ALONSO & CARUS IRON WORKS, INC.
P. O. Box 566, Catano, Puerto Rico 00632 Phone (809) 788-1063.
Road 869 Km 0 Hm 9, Palmas Ward, Catano, Puerto Rico
TELEX NO 345060

CONTRACTOR OR OWNER: ELI LILLY INDUSTRIES, INC.

PROJECT: TANK FARM PMO. PROJ. P.R. 00016

DESCRIPTION: WASTE STORAGE TANK 20' DIA x 24' T.T. - T-138

PROJ. NO: P.O. JOB No 942-86

DESIGNED: C. M. & ASS.

DRAWN: A.C. DRAWN: S.S. DRAWING No 10-265-00-423 C 1/1

CHECKED: M.O. CHECK: 12-22-88

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

REPORT OF LIQUID PENETRANT EXAMINATION

Project TANK FARM P.M. 8 PROF. P.R. 880

Quality requirements — section no. ASME - SECT. V

Reported to Eli Lilly - Mayaguez

WELD LOCATION AND IDENTIFICATION SKETCH

TANK # 1

(SEE SKETCH)

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept.	Reject	Accept.	Reject	
4/26	Ring #1	all					
	vertical joints	all					
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				
	Ring #2						
	Verticals	all					
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				
	Ring #3	all					
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and teste accordance with the requirements

Inspector Wilfredo Rivera

Test date 4-26-89

Method of inspection:
- x Fluorescent Penetrant
- __ Water washable
- x Visible Liquid penetrant
- __ Post-Emulsifiable
- __ Solvent-removable

Equipment Zyglo ZL ZZ/A

Contractor Alonso & Carus

Authorized By Ing. Montalvo

Date 4-25-89

Procedure A-3 Metho A

Revision No.: 0

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

REPORT OF LIQUID PENETRANT EXAMINATION

Project TANK FARM P.M. 8 PROF. P.R. 880

Quality requirements — section no. ASME - SECT. V

Reported to Eli Lilly - Mayaguez

WELD LOCATION AND IDENTIFICATION SKETCH

TANK #1

(SEE SKETCH)

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept	Reject	Accept	Reject	
4/26	Horizontal						
	H-1	all	X				
	H-2	all	X				
	H-2	all	X				
*	F-1	small		X	X		Pin Hole
*'	Shell to Bottom						
	Double fillet						
	Tee Joint						
	Nozzle Weld	all	X				
	Man Hole Weld	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements

Inspector Wilfredo Rivera

Test date 4-26-89

Method of inspection:
- x Fluorescent Penetrant
- __ Water washable
- x Visible Liquid penetrant
- __ Post-Emulsifiable
- __ Solvent-removable

Equipment Zyglo ZL ZZ/A

Contractor Alonso & Carus

Authorized By Ing. Montalvo

Date 4-25-89

Procedure A-3 Metho A

Revision No.: 0

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

REPORT OF LIQUID PENETRANT EXAMINATION

Project TANK FARM P.M. 8 PROF. P.R. 880

Quality requirements — section no. ASME - SECT. V

Reported to Eli Lilly - Mayaguez

WELD LOCATION AND IDENTIFICATION SKETCH

TANK #2

(SEE SKETCH)

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept.	Reject	Accept.	Reject	
4/27	Ring #1						
	vertical joints						
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				
	Ring #2						
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				
	Ring #3						
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements

Inspector Wilfredo Rivera

Test date 4-27-89

Method of inspection:
- X Fluorescent Penetrant
- __ Water washable
- X Visible Liquid penetrant
- __ Post-Emulsifiable
- __ Solvent-removable

Equipment Zyglo ZL ZZ/A

Contractor Alonso & Carus

Authorized By Ing. Montalvo

Date 4-25-89

Procedure A-3 Metho A

Revision No.: 0

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

REPORT OF LIQUID PENETRANT EXAMINATION

Project TANK FARM P.M. 8 PROF. P.R. 880

Quality requirements — section no. ASME - SECT. V

Reported to Eli Lilly - Mayaguez

WELD LOCATION AND IDENTIFICATION SKETCH

TANK #2

SEE SKETCH

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept.	Reject	Accept.	Reject	
4/27	Horizontal	all					
	H-1	all	x				
	H-2			X	X		*burn through small area
	H-3						
	*F-1	all	X				
	*Shell to bottom						
	double - fillet						
	Tee joint						
	Nozzle weld	all	X				
	manhole weld	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements

Inspector Wilfredo Rivera

Test date 4-27-89

Method of inspection:
- x Fluorescent Penetrant
- __ Water washable
- X Visible Liquid penetrant
- __ Post-Emulsifiable
- __ Solvent-removable

Equipment Zyglo ZL ZZ/A

Contractor Alonso & Carus

Authorized By Ing. Montalvo

Date 4-25-89

Procedure A-3 Metho A

Revision No.: 0

ALONSO & CARUS iron works, inc.

ROAD 869, KM. 0.09, BO. PALMAS, P. O. BOX 566, CATAÑO, PUERTO RICO 00632
PHONE (809) 788-1065, TELEX NO. 3450186 ALONCAR

REPORT OF LIQUID PENETRANT EXAMINATION

Project TANK FARM P.M. 8 PROF. P.R. 880

Quality requirements — section no. ASME - SECT. V

Reported to Eli Lilly - Mayaguez

WELD LOCATION AND IDENTIFICATION SKETCH

TANK #3

(SEE SKETCH)

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept.	Reject	Accept.	Reject	
4/28	Ring #1						
	Vertical Joints	all	X				
	V-1	all		X	X		Weld was not completed
	V-2	all	X				
	V-3						
	Ring #2						
	Vertical	all	X				
	V-1	all	X				
	V-2	all	X				
	V-3	all	X				
	Ring #3						
	Vertical	all	X				
	V-1, 2 & 3	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements

Inspector Wilfredo Rivera

Test date 4-28-89

Method of inspection:
- [X] Fluorescent Penetrant
- [ ] Water washable
- [X] Visible Liquid penetrant
- [ ] Post-Emulsifiable
- [ ] Solvent-removable

Equipment Zyglo ZL ZZ/A

Contractor Alonso & Carus

Authorized By Ing. Montalvo

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WELD LOCATION AND IDENTIFICATION SKETCH

TANK #3

(SEE SKETCH)

Date	Weld identification	Area	Interpretation		Repairs		Remarks
			Accept.	Reject	Accept.	Reject	
4/29	Horizontal						
	H-1	all	X				
	H-2	all		X	X		Burn through
	H-3	all	X				
	*F-1						
	*Shell to bottom						
	double - fillet						
	Tee Joint						
	Nozzle weld	all	X				
	Manhole weld	all	X				

We, the undersigned, certify that the statements in this record are correct and that the welds were prepared and tested in accordance with the requirements

Inspector Wilfredo Rivera

Test date

Method of inspection:
- # Fluorescent Penetrant
- __ Water washable
- X Visible Liquid penetrant
- __ Post-Emulsifiable
- __ Solvent-removable

Equipment Zyglo ZL ZZ/A

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